stron

Oxford, University of. Observat

# *Sixty-Fifth Annual Report of the Visitors of the University Observatory for 1939.*

Physical & Applied Sci. Serials

## BOARD OF VISITORS, 1940.

THE VICE-CHANCELLOR (G. S. GORDON, M.A., President of Magdalen).
THE SENIOR PROCTOR (A. N. Bryan-Brown, M.A., Fellow of Worcester).
THE JUNIOR PROCTOR (S. P. McCallum, M.A., D.Phil., Fellow of New College).
F. HOMES DUDDEN, D.D., Master of Pembroke (*Chairman*).
THE ASTRONOMER ROYAL (H. Spencer Jones, M.A., D.Sc., F.R.S.).
THE DIRECTOR OF THE CAMBRIDGE OBSERVATORY (Sir A. S. Eddington, O.M., Hon. D.Sc., F.R.S.).
THE RADCLIFFE OBSERVER (or a person deputed by the Radcliffe Trustees).

| | |
|---|---|
| J. S. E. TOWNSEND, M.A., F.R.S., Fellow of New College.<br>F. A. LINDEMANN, M.A., F.R.S., Fellow of Wadham and Student of Christ Church. | Until Oct., 1940. |
| E. A. MILNE, M.A., F.R.S., Fellow of Wadham.<br>G. M. B. DOBSON, M.A., D.Sc., F.R.S., Fellow of Merton. | Until Oct., 1945. |

---

LIBRARY
Pers
SEP 16 1942
UNIVERSITY OF TORONTO

This report refers to the calendar year 1939.

### I. Staff.

Dr. Theodore Dunham, Jr., of Mt. Wilson worked at the observatory as Research Associate for some ten weeks in the Trinity Term. With the consent of Hebdomadal Council and the Radcliffe Trustees, Dr. Zanstra's tenure of the Radcliffe Travelling Fellowship was extended by one year to October 1941. The first half of the extended period was completed in the autumn of 1939 when, in accordance with the terms of the Fellowship, Dr. Zanstra left for the Radcliffe Observatory, Pretoria. Apart from these changes, and the absence of Mr. J. S. Hughes and the director on active service since September, the staff remains the same as reported last year.

## II. Instruction.

The following courses of lectures have been delivered at the observatory by the director:

| *Term.* | *Subject.* | *Number attending course.* |
|---|---|---|
| H. 1939 | Problems in Astrophysics | 3 |
| H. 1939 | The Earth in the Solar System | 20 |
| T. 1939 | Field Astronomy (practical) | 10 |

The second of these lectures was designed to give students reading Geography an elementary knowledge of astronomy, while the third was a continuation of the work with the students reading Engineering.

The usual weekly colloquium in astrophysics was held with the collaboration of Professor Milne during Hilary and Trinity Terms. In his absence and that of the director it was successfully continued during the Michaelmas Term.

The observatory was open as usual on Saturday evenings during the Hilary and Michaelmas Terms, and in addition by arrangement for visits of various scientific societies in the University. At the conversazione of the O.U.J.S.C. in Trinity Term, Lyot's film on solar prominences was exhibited.

## III. Equipment and Buildings.

The solar equipment was in practically continuous use until the beginning of July. At that time advantage was taken of offers by Grubb, Parsons, and by Hilger's to re-examine and to re-figure some of the optical parts. The various mirrors and prisms were therefore then sent to the makers; this work was not completed on the outbreak of war, and the various parts were returned to Oxford. They have been securely boxed, and stored in the seismological basement.

Other changes made necessary by the outbreak of war have been the internal strengthening of the seismological basement and the provision of an emergency exit; the camouflaging of the two domes and provision of sand-bag protection for the mechanical parts of the solar spectroscope. This work has been carried out in a most efficient manner by G. H. Neale.

At the invitation of the Board of Visitors, and with the sanction of the Hebdomadal Council, the office of the Royal Astronomical Society and its Assistant Secretary have been housed in the observatory for the duration of the war. In addition various irreplaceable records of the Society and the more valuable parts of its library have been stored in the seismological basement.

## IV. Work.

*Astrophysics.* Miss Adam has practically completed the measurement and reduction of a selected group of faint lines in the solar spectrum near $\lambda$ 4100. In confirmation of her earlier work she finds this new group to show marked strengthening at the limb, but, contrary to expectation, finds that lines faint on account of low relative abundance are strengthened nearly as much as the faint interlocked members of strong multiplets. In addition to this work Miss Adam has since the beginning of September been responsible for the administration of the observatory.

The director's work on the numerical integration of the equation of transfer for absorption lines has been continued, and most of the earlier difficulties have now been overcome. It is hoped that an account of this investigation will be communicated to the Royal Astronomical Society during 1940.

Dr. Dunham continued and extended his application of photoelectric cells to the measurement of solar absorption line profiles. In order to eliminate the effects of varying atmospheric transmission 'a null method' was used, the flux from a small wavelength interval within the line being balanced against the flux, reduced by a known amount, from the adjacent continuous spectrum. In spite of bad observing weather during the latter part of his stay, and in spite of considerable difficulties in fitting his apparatus to the Oxford solar spectroscope, Dr. Dunham succeeded in making determinations of the profiles of H$\alpha$ and the D-lines, as well as investigating the instrumental pattern of the spectroscope with a Philip's Na lamp. No account of his work in Oxford would be complete which did not mention the inspiration and help which he gave to every member of the staff in their various researches.

Mr. Evans has completed his observational study of the profile of H$\alpha$ as a function of position on the solar disk. A notable feature of this investigation has been his determination of the instrumental pattern of the spectroscope from the profiles of the D-lines observed in absorption from a 25-cm. tube, in which a little Na was distilled, the tube being maintained at a temperature of 130° C. The corrected solar contours so found lend little support to Unsöld's suggestion that uncompensated cycles play a significant part in the formation of H$\alpha$. An account of this investigation has been communicated to the Royal Astronomical Society.

Dr. Zanstra has continued his work, both experimental and theoretical, on the radial instability in fluid motion. He succeeded in establishing experimentally the existence of this instability under conditions supposed to favour stability, and at the same time was able to show the existence of far-reaching analogies between this instability and the motions observed by Lyot in his studies of solar prominences.

*Astrographic Catalogue.* Under the supervision of Mr. H. Scott Barrett the five plates still awaiting measurement in zone +33° have now been completed by Mr. Cook, and in addition all the plates in this zone have been revised. Further, the calibration of Burnet's diameters has been completed, and the necessary corrections are in process of being incorporated in the copy for press.

The copy for press is now completed for the whole series of 320 plates for zones +32° and +33°. As reported last year it was proposed to use a grant from the International Astronomical Union to meet the costs of printing zone +32°. Tenders had been received from several firms, and the contract, which awaited only the approval of the General Secretary of the Union, was about to be awarded at the outbreak of war. On account of the immediately subsequent rise in cost of paper and printing the question must now remain temporarily in abeyance.

*Seismological Summary.* Prior to September good progress was being made in the preparation and publication of the Summary. With the departure of Mr. Hughes on active service, however, the full brunt of his work as well as her own has fallen on Miss Bellamy. A considerable slowing down in the rate of progress was therefore inevitable, and though Mr. Hughes is occasionally able to give a little help the Summary must now necessarily fall still further in arrears.

A meeting of the International Seismological Association was held in Washington at the beginning of September. Many proposals for improvements and extensions of the Summary were on the agenda, but in view of the uncertain future it was decided that the Summary should be continued along the same lines as at present.

## V. Publications.

The following papers have been published during the year as a result of work done at the observatory:

E. F. Bellamy. *Index to the International Seismological Summary for 1931, 1932, 1933* (County Press).

D. S. Evans. 'The Use of the D-Lines of Sodium in Absorption for the Determination of Spectroscopic Pattern', *The Observatory*, vol. 62, p. 231.

J. S. Hughes and E. F. Bellamy. *The International Seismological Summary*, Parts 2, 3, 4, 1933. (County Press.)

H. H. Plaskett. 'The Oxford Solar Telescope and Hartmann Tests of its Performance', *Monthly Notices*, R.A.S., vol. 99, p. 219.

H. Zanstra. 'Some Hydrodynamical Experiments in Connection with Prominences', *Monthly Notices*, R.A.S., vol. 99, p. 499.

The last two of these papers in their reprint form appeared as Communications from the University Observatory, Nos. 14, 15.

Communications Nos. 13 and 16 were two papers by G. L. Camm with the titles 'A Study of Globic Rotation, based on the Velocity of the Planetary Nebulae' and 'The Sun's Speed of Globic Rotation determined from the Globular Clusters'.

H. H. PLASKETT.

UNIVERSITY OBSERVATORY,
OXFORD.
4 *February* 1940.

UNIVERSITY PRESS
OXFORD, ENGLAND